EXTRACTION OF ALGAE OIL IN SUPERCRITICAL CO2 USING A SOYBEAN SURFACTANT

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The use of a soybean surfactant in supercritical fluid matrix has been examined for recovering oil from microalgae (Chlorella pyrenoidosa). Soybean lecithin was first purified with acetone and ethanol and later acetylated with acetic anhydride to produce a mixture of acetylated products. Then, N-Acetylated phosphatidylethanolamine (PE) was separated with acetone and further purified by column chromatography. The purity and molecular weight of the synthesized N-acetylated PE was determined by HPLC and ESI-MS analysis. Then, supercritical fluid-N-acetylated PE coupled extraction of oil was examined using pure and modified CO_2 at various operating conditions using a pressure range of (15- 40 MPa), temperature range of (318-338 K) and extraction time from 40-120 min. The maximum extraction condition was obtained when operating at 40 MPa, 338 K, surfactant:algae mass ratio (0.6), extraction time (120 min) and using a mobile phase of 10% ethanol/90% CO_2 leading to an oil yield of 52 wt. %, which produced higher oil yield compared to conventional extraction methods. This extraction approach proves to be a feasible process for enhanced oil recovery from microalgae.